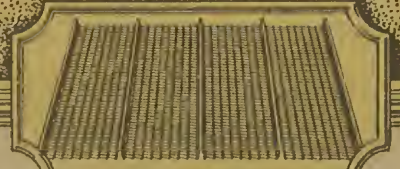
MILCOR
REINFORCING
RIB LATH
3/4 inch Stay-Rib No. 3



MILCOR
· FIRESAFE ·
BUILDING PRODUCTS
MILWAUKEE CORRUGATING
COMPANY
MILWAUKEE, WISCONSIN

MILCOR

¾-inch Stay-Rib No. 3
REINFORCING LATH

A Technical Data Book

for Architects, Engineers, and Contractors
featuring Milcor Methods and Materials for
Firesafe Reinforced Concrete Construction

CATALOG No. 20-D

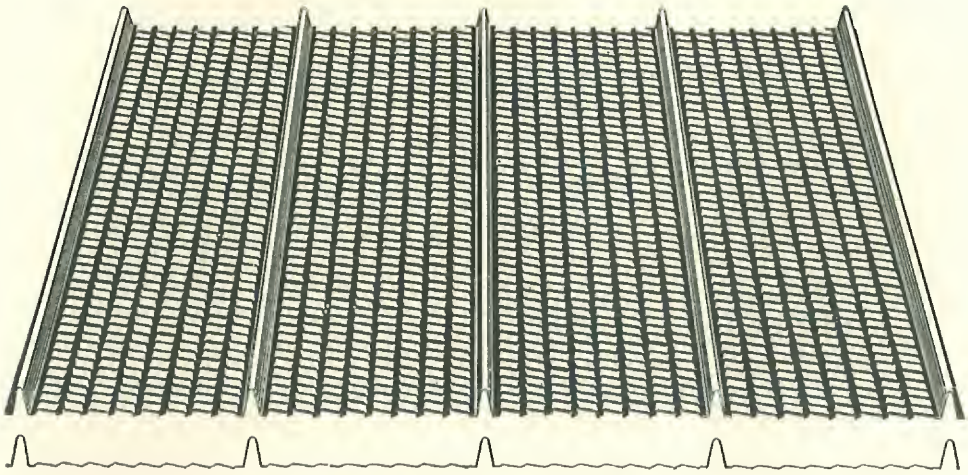
Supplement to the 1927 Edition of
"The Milcor Manual"

MILWAUKEE CORRUGATING COMPANY

L. KUEHN, President and Treasurer — A. J. LUEDKE, Secretary and Assistant Treasurer

MILWAUKEE, WISCONSIN

CHICAGO, ILL. KANSAS CITY, MO. LA CROSSE, WIS. BOSTON, MASS.

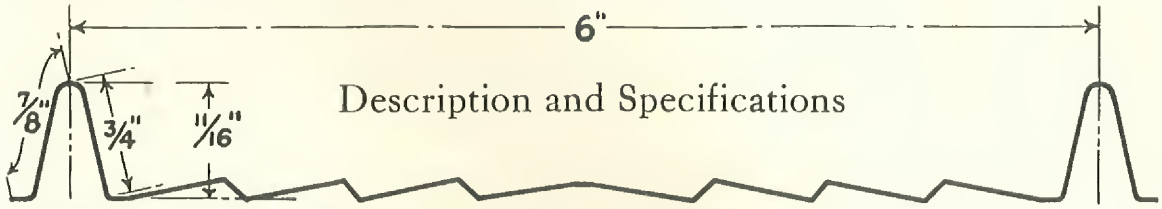


MILCOR
¾-inch Stay-Rib Metal Lath No. 3

FOR many years, experts in reinforced concrete construction have approved the use of heavily ribbed metal lath as reinforcement for floors and roofs. They have endorsed thoroughly the fire-safety, load-carrying safety and practicability of this type of construction. The *method* is not new.

Encouraged by the success of Milcor Stay-Rib Metal Lath No. 1 and ⅜-inch Stay-Rib No. 2 in the field of Better Plastering, Milcor engineers made a thorough study of the requirements of metal lath as a reinforcing agent, and sensed the possibility of designing a superior type of ¾-inch rib lath for reinforced concrete construction. Backed by years of experience and the basic advantages of Stay-Rib design, the possibility became a reality in the form of Milcor ¾-inch Stay-Rib No. 3.

This lath has proved its value in exhaustive tests and in practical use. The facts set forth briefly in the following pages and a careful examination of the product itself are certain to commend Milcor ¾-inch Stay-Rib No. 3 to you as exceptionally meritorious. If you haven't examined this unusual reinforcing lath, be sure to send for free sample.



Description and Specifications

Specifications: The heavy ribs of Milcor ¾-inch Stay-Rib No. 3, (actually 11/16-inch high and spaced 6 inches on centers), are cold drawn (not stamped), and the connecting mesh is cut and expanded, from Steel, "Coppered Metal," or pure ARMCO Ingot Iron.

This lath is carried in stock PAINTED only, in the following weights of Steel and "Coppered Metal":

No. 28 Ga. 0.46 lbs. per sq. ft.
No. 26 Ga. 0.56 lbs. per sq. ft.
No. 24 Ga. 0.74 lbs. per sq. ft.

In ARMCO Ingot Iron, Painted, it is carried in stock in two weights only: No. 26 Ga. (0.56 lbs. per sq. ft.) and No. 24 Ga. (0.74 lbs. per sq. ft.).

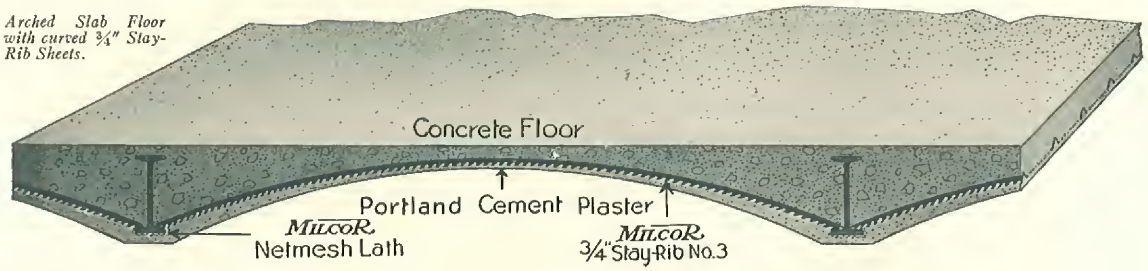
It can be made to order from tight-coat galvanized sheets of Steel, "Coppered Metal," or ARMCO Ingot Iron. In this grade it is available only in No. 28 Ga. (0.53 lbs. per sq. ft.)

Cross Sectional Areas are as follows:

No. 28 Ga. — .1235 sq. in. per ft. width
No. 26 Ga. — .1482 sq. in. per ft. width
No. 24 Ga. — .1977 sq. in. per ft. width

The covering width of each sheet of Milcor ¾-inch Stay-Rib No. 3, is 24 inches. The practicability of this standard width is readily appreciated. Sheets are regularly furnished in lengths of 4, 5, 6, 7, 8, 9, 10, 11, or 12 feet. Sheets of intermediate length can be furnished, cut to exact lengths without extra charge for the cutting, but in such cases the cost of the wasted stock is included — for instance, sheets ordered 11½ feet long will be cut to that size. but will be charged at the 12-foot rate. Specially designed shears which cut clean and square without damaging the ribs, can be purchased or rented from us. The shears may be mounted on skids or on trucks, for convenience in moving.

Instructions for ordering Curved Sheets on page 4.

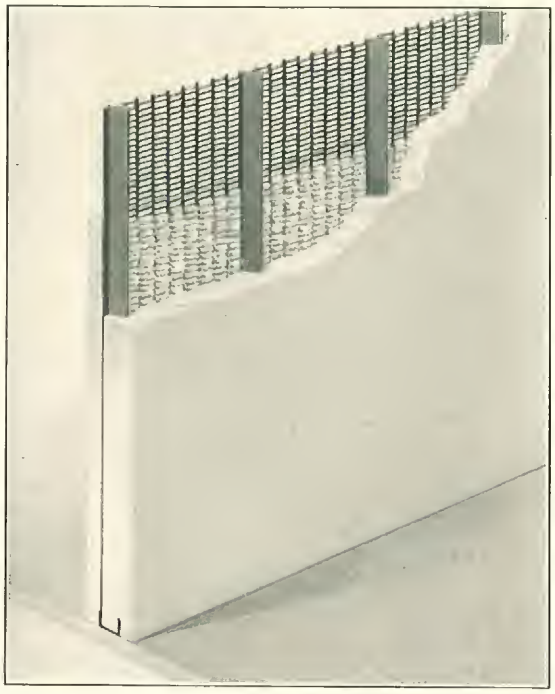


Arched Slab Floor with curved ¾" Stay-Rib Sheets.

Description: While Milcor ¾-inch Stay-Rib No. 3 was designed particularly for use as a fireproofing reinforcement for concrete floors and roofs, it is also practical in solid partition work, curtain-wall construction, and other fireproofing work, where because of the rigidity and strength of its ribs and mesh, it can be used without supporting studs or channels—in other words, its integral qualities are those of metal lath and studding combined, for upright partition work. Some of the many uses to which Milcor ¾-inch Stay-Rib No. 3 is particularly well adapted, are outlined on pages 5, 6, 7 and 8.

The Milcor process of forming the heavy ribs is important. They are cold-drawn — not stamped — and each rib is kept precisely straight and true; absolutely uniform in shape. The sides of each rib are V-shaped, at an angle that insures maximum rigidity.

The method of cutting and expanding the metal between ribs provides exceptional strength at the juncture of the mesh with the ribs, and the design of the mesh, with intermediate "stays" running parallel to the ribs between each two rows of cross strands, produces that remarkable mesh-strength between the ribs which is one of the outstanding characteristics of Milcor ¾-inch Stay-Rib No. 3.

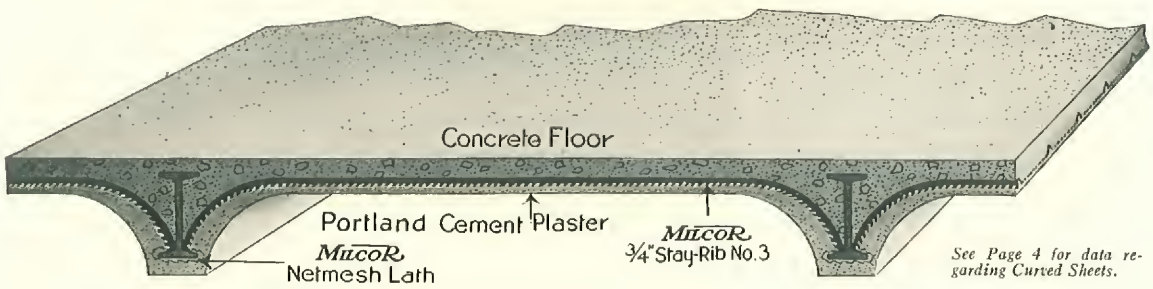


Used for solid partition, with ribs perpendicular to floor; no upright channels required.

Furthermore, the shape of the openings and the position of the strands in the mesh, offer an ideal condition for a permanent bond of the concrete with this reinforcing material. The importance of this bond will be shown further along in this treatise. And although the concrete is enabled to flow readily around these strands, Milcor ¾-inch Stay-Rib No. 3 permits practically no loss of concrete during the pouring process.

Another practical advantage of this modern reinforcing lath is the fact that workmen can handle it without danger of cutting or scratching their hands.

The longitudinal rigidity of Stay-Rib, due to the design of the mesh and the combination of



See Page 4 for data regarding Curved Sheets.

Milcor Shears for ¾-inch Stay-Rib cut the lath cleanly, without damaging the ribs. Shears may be rented or purchased.

intermediate "stays" and extra-sturdy ribs, is superior to that of any other type of metal lath reinforcing material. This superior rigidity permits greater strength with fewer ribs — in other words, with ribs spaced farther apart — which offers a structural advantage that will be explained later.

While attaining this desirable rigidity the long way of the ribs, Stay-Rib design permits a flexibility the other way which makes special forming possible where required, without damage to the strands.

All Milcor *painted* lath is heat-treated and re-annealed after being cut and expanded, which gives the metal longer life and greater strength. This heat-treating process is important. The electrons, or steel and iron molecules, become displaced through the strain of cutting and expanding the solid sheet metal. Heat-treating relieves the stress and brings the electrons back to their original positions. The result is greater toughness and longer life for the metal. Milcor Special Elastic Paint adds further protection.

Bundling for Shipment: Milcor ¾-inch Stay-Rib No. 3 sheets are prepared for shipment in bundles, with ribs of pairs of sheets reversed, wired six sheets to the bundle. Reversing the sheets is better than nesting the ribs.

Milcor ¾-inch Stay-Rib No. 3 may be wired, clipped, tied, wedged, or fastened in any approved manner, according to the special type of steel lumber or patented joists that may be used.

We do not furnish clips, or any other type of fastening units, because the method of fastening is determined entirely by the type of structural members used. Careful tying is always safe, but other patented clips, etc., are also very efficient when used with the type of structural members for which they were designed. We shall be glad to recommend the proper type of fastening unit for various types of metal lumber, joists and beams.

Instructions for Ordering Curved Sheets of Milcor ¾-inch Stay Rib No. 3

THE value of curved sheets of Milcor ¾-inch Stay-Rib Lath No. 3, acting as they do in the dual-capacity of curved form and reinforcement for concrete, is readily appreciated by every structural engineer and contractor who has experienced the high cost of other types of curved or arched construction.

This metal lath can be curved — ribs to the outside only — to any radius of 12 inches or over in the following ways: Curved to a complete

Fig. A—Sheets may be curved to form, complete circle for various uses.

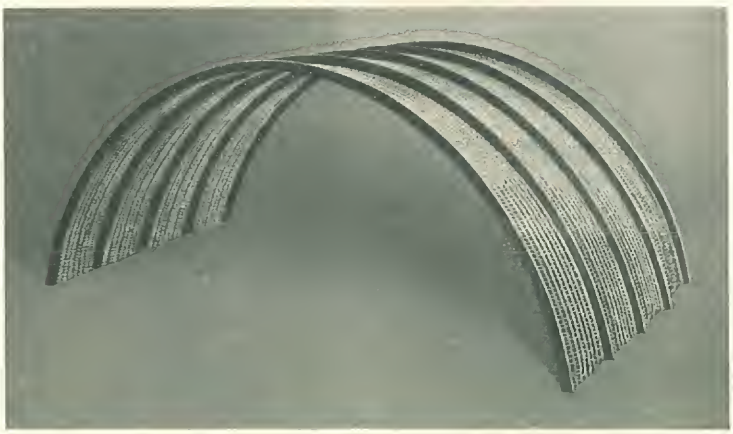


Fig. B—Lath Sheets may be curved to any radius, or curved at ends and flat in center (as shown on page 5), with ribs to the outside only.

Fig. C—Curved at ends, flat in center

circumference as shown in Fig. A; curved to a wide radius to form an arch of specified height and width as shown in Fig. B; curved at either one or both ends, with center flat, as shown in Fig. C.

The sheets may be ordered curved at our factory at slight additional cost. When ordering sheets to be curved by us, be sure to give exact width of the arch and the height of the rise, as well as the radius to which sheets are to be curved. If possible it is well to submit detailed drawings and complete description so our engineering department will have opportunity to co-operate to the fullest extent.

Principal Uses of Milcor ¾-inch Stay-Rib No. 3

THE chief purpose for which Milcor ¾-inch Stay-Rib No. 3 is designed, is its use in concrete slab construction for floors and roofs, where it serves not only as a form upon which the wet concrete is poured, but also acts as a highly efficient expanded metal reinforcement for the concrete.

In this capacity it is used most extensively with steel joist construction or metal lumber. In floor construction the ability of Milcor ¾-inch Stay-Rib No. 3 to act as a form to hold the wet concrete is of greatest importance, while in long span roof slab construction its superior reinforcing qualities as well as its qualities which make it ideal as a form for the concrete, commend this modern Milcor product for all conditions where this type of construction is desired. The shape and position of the metal mesh and the elimination of unnecessary solid ribs, are important factors in accomplishing the particularly strong bond which results between the concrete and ¾-inch Stay-Rib No. 3. The exceptional strength of this bond is vital to the safety of this type of construction.

As shown on pages 2 and 3, this lath may be used in solid slab construction for reinforced concrete floors or roofs, or may be used curved to a single arc, or curved at each end but flat in the center, for arched or bridge-type floor construction. It is recommended that wherever curved sheets are to be used, the curving be done at the factory, where specifications will be precisely adhered to. (See instructions for ordering on page 4.)

There are many adaptations of the above mentioned uses, and in addition, a wide variety of other purposes to which this product is ideally suited.

Not only does Milcor ¾-inch Stay-Rib No. 3 metal lath meet every requirement most efficiently and economically for flat-type reinforced concrete roofs, but it is also the finest product ever offered for pitched roofs, saw-tooth and monitor-type roofs (with walls and roof both constructed by this approved reinforced concrete method).

This lath may be used as a reinforcing material for the concrete base of Terrazzo, Tile, or wood finished floors — over wood joists or wood beams, over steel I-beams or any of the newer types of fabricated steel beams, metal lumber or patented bar joists and trusses.

(Continued on next page.)

Principal Uses of Milcor ¾-inch Stay-Rib No. 3

(Continued)

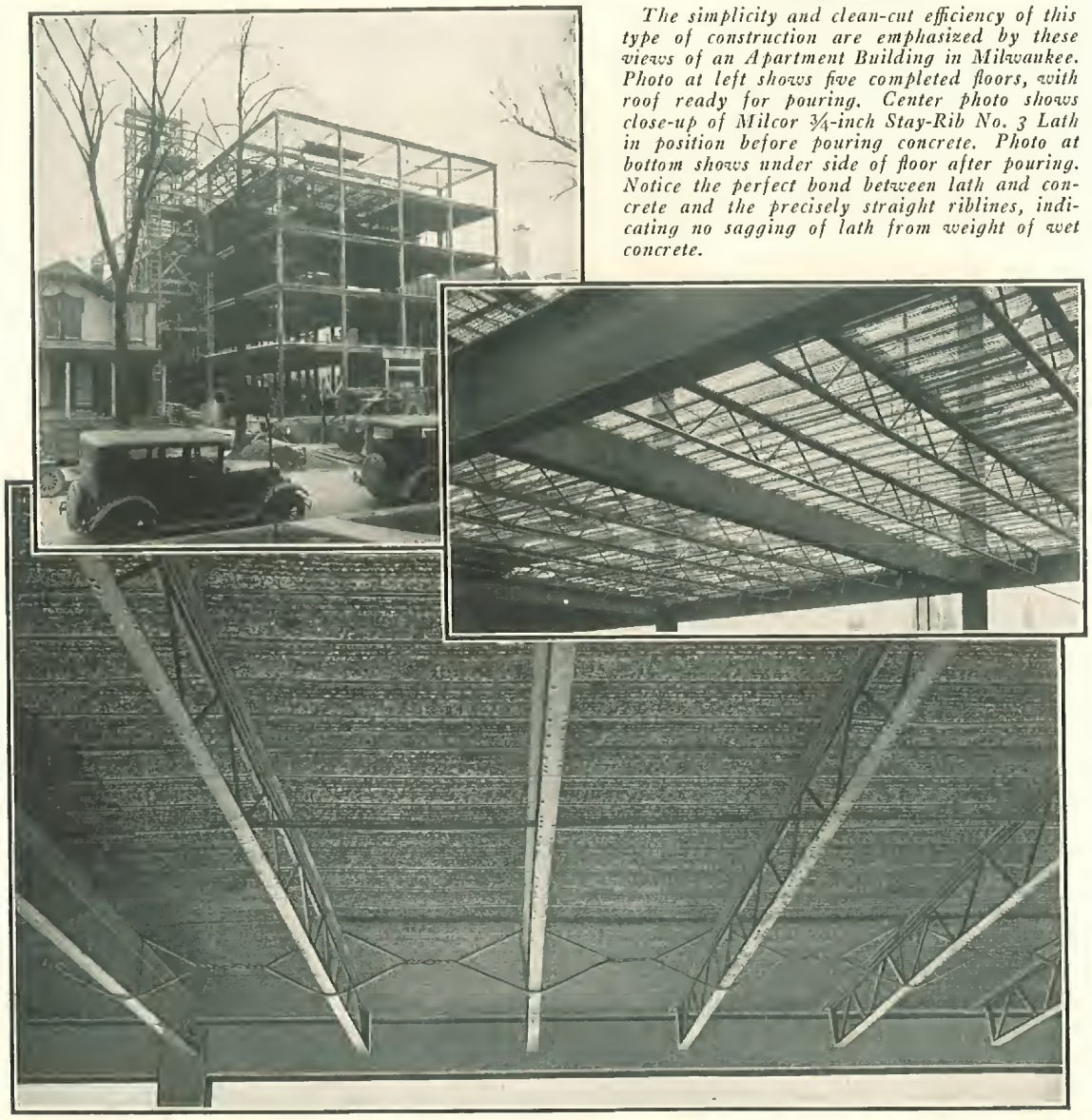
For monolithic concrete wall construction this lath is extremely practical because its heavy ribs provide sufficient rigidity and stiffness to permit elimination of stiffening channels; and no forms are needed, since the concrete can be spread on first from one side and then from the other, to the desired thickness, the process being the same for solid partitions, with the ribs of the lath perpendicular to the floor and anchored at floor and ceiling with runner channels or light angle irons.

While reinforced concrete floor and roof construction constitute the chief uses of Milcor ¾-inch Stay-Rib No. 3, these are only two of its many adaptations in reinforcing and fireproofing work. Not all of its adaptations involve the use of concrete, either, for this lath serves as an admirable plaster base because of its superior stiffness, precisely true lines and excellent gripping or bonding qualities.

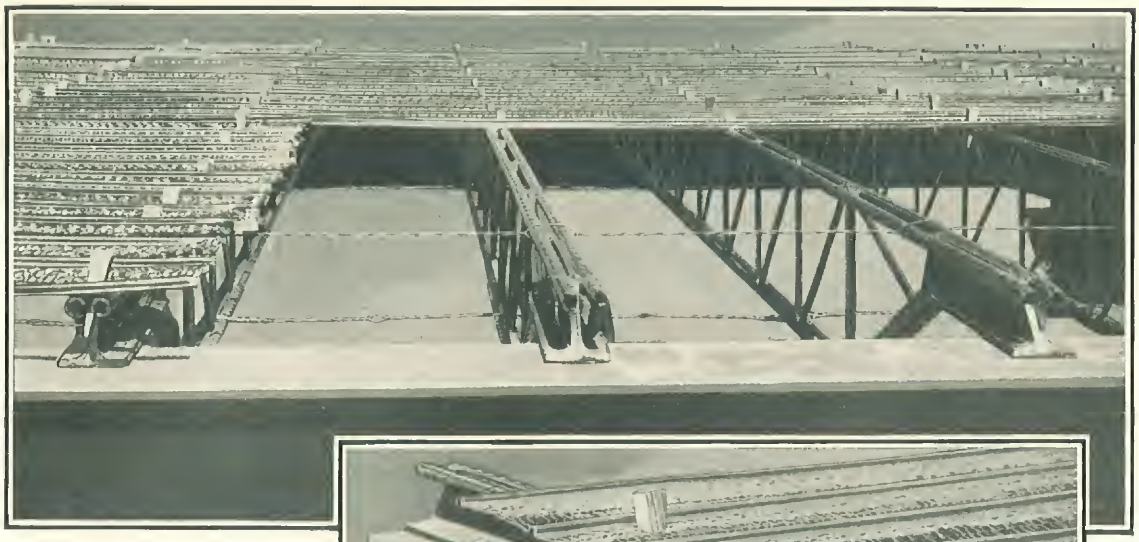
For plastering unusually long spans between widely spaced supporting members, it is particularly practical.

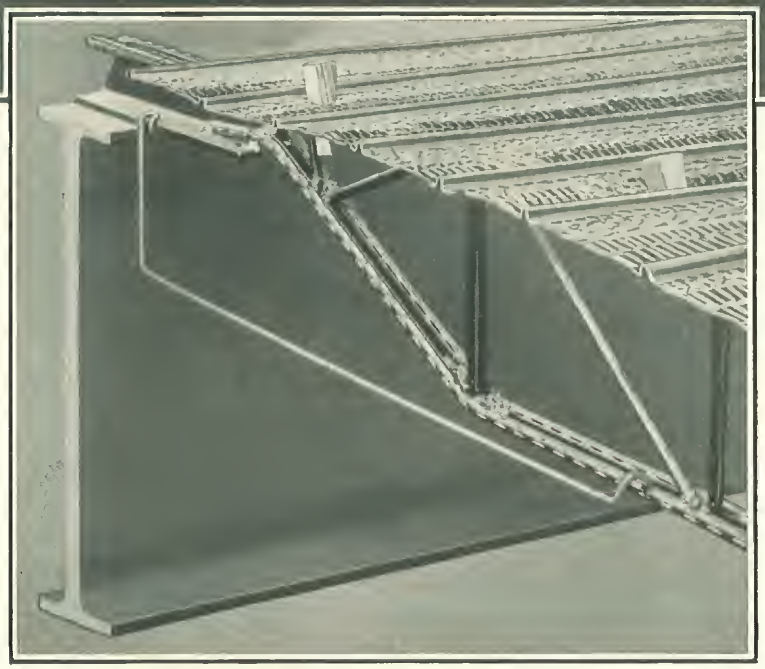
It is ideal for solid partition work, as shown on page 3, because of its heavy ribs, which make

(Continued on next page.)



The simplicity and clean-cut efficiency of this type of construction are emphasized by these views of an Apartment Building in Milwaukee. Photo at left shows five completed floors, with roof ready for pouring. Center photo shows close-up of Milcor ¾-inch Stay-Rib No. 3 Lath in position before pouring concrete. Photo at bottom shows under side of floor after pouring. Notice the perfect bond between lath and concrete and the precisely straight riblines, indicating no sagging of lath from weight of wet concrete.





The "Havemeyer Truss" — a popular type of bar joist — with Milcor ¾-inch Stay-Rib No. 3 fastened down with pegs which are wedged in between the two bars of the joists. This is a simple, safe, economical method of fastening, made possible by the unique design of the "Havemeyer Truss."

The close-up view at right shows the construction at the end of a Havemeyer Truss.

Principal Uses

(*Continued*)

possible the elimination of upright supporting channels or studs. When used in this manner, the ribs are placed perpendicular to the floor. A runner channel or angle iron is usually used to insure a true partition line at the ceiling and an angle iron along the floor to keep that line true. Bracing is not required while plaster is being applied, unless the wall is unusually high.

For curtain-wall construction on industrial buildings this lath is also ideal—Portland Cement Plaster must be used for the exterior and interior surfaces.

Because the use of forms or stiffening channels is eliminated and much material is saved when Milcor ¾-inch Stay-Rib No. 3 is used for 2-inch monolithic concrete non-bearing walls, partitions, sidings, curtain walls, etc., such construction costs about half the price of brick — in fact, it costs less than any other type of firesafe, permanent construction — and at the same time a gain of 12 to 20 inches in floor space is accomplished as compared with the more bulky types of construction.

For suspended ceilings, Milcor ⅜-inch Stay-Rib No. 2 is recommended, although Milcor ¾-inch Stay-Rib No. 3 may be used. For hollow-wall construction, Milcor ⅜-inch Stay-Rib No. 2, or Milcor Stay-Rib Lath No. 1, is recommended. The ribs of all Stay-Rib Lath project the lath far enough away from the studs to make the use of furring strips unnecessary. Hollow-wall partitions of this type possess superior sound-proof qualities in addition to their other desirable qualities. Exterior stucco work on residences may be done on Milcor Netmesh (diamond expanded) Metal Lath, Stay-Rib Lath No. 1, or ⅜-inch Stay-Rib No. 2.

(*Continued on next page.*)

Principal Uses of Milcor ¾-inch Stay-Rib No. 3

(Continued)

Summarizing some of the uses of Milcor ¾-inch Stay-Rib No. 3, the following list will suggest many other purposes to which this product is ideally suited:

For floors, roofs, walls and partitions of factories, warehouses, foundries, machine shops, rolling mills, car barns, round houses, power plants, grain elevators, etc. Also for office buildings, stores and public buildings, residences, garages, small buildings, etc. Also for Motion Picture booths, storage bins, tool rooms, etc. For elevator shafts, dumb waiter shafts, wiring and heating system shafts and channels, etc.

For railings, steps, seat-risers, stairways.

For fences and retaining walls.

For farm buildings, silos, cisterns, culverts.

For chimneys, conduits, flumes, sewers, water mains, air ducts, tunnels, etc.

For tanks, reservoirs, disposal tanks, vats, water troughs, etc.

For bridges, roadways, walks, etc.

For fireproofing steel beams, load-carrying steel columns, etc.

For false beams, cornices and heavy ornamental plastering.

For galleries, booths, hand-ball courts, etc.

Engineering Data

Based on Results of Tests to Destruction

THIS is not theoretical data — the Table of Safe Loads on page 9 is the result of "breakdown" tests, or tests to destruction, made with due regard for field conditions, based on approved engineering practice with relation to weights of lath and steel lumber, application of lath, and mixing, pouring and curing the concrete. These tests were designed to cover a variety of actual field conditions. In each test data was secured to indicate the strength of Milcor ¾-inch Stay-Rib No. 3 as a formwork for carrying the wet concrete as well as a reinforcement for the concrete after the slabs were cured.

The tests were made over a period extending from July 19, 1926 to April 2, 1927. In each test the steel lumber supports were designed to carry the load of the floor slab and a live load sufficient to include the full strength of the construction. For these tests standard structural principles of design were employed instead of adhering to the Design Tables furnished by manufacturers of patented steel lumber or bar joists.

In actual use the efficiency of Milcor ¾-inch Stay-Rib No. 3 with steel beams, patented steel lumber of various types, and with many kinds of patented bar joists, has been thoroughly demonstrated. The illustrations on pages 6 and 7 show this lath in use in connection with bar joists.

Weights of Lath Carrying Wet Concrete Over Various Spans

Gauge of Milcor ¾″ Stay-Rib No. 3.	Weight of Lath per Sq. Ft.	Allowable Spans for Wet Concrete Poured to Thickness Indicated:—				
		2″ Slab	2½″ Slab	3″ Slab	3½″ Slab	4″ Slab
28 Ga.	0.46 lb.	3 ft. 3 in.	3 ft.	2 ft. 9 in.	2 ft. 6 in.	2 ft. 3 in.
26 Ga.	0.56 lb.	3 ft. 6 in.	3 ft. 3 in.	3 ft.	2 ft. 9 in.	2 ft. 6 in.
24 Ga.	0.74 lb.	4 ft.	3 ft. 9 in.	3 ft. 3 in.	3 ft.	2 ft. 9 in.

When longer spans than those given above are required, temporary supports should be used to maintain these maximum spacings.

TABLE OF TOTAL SAFE LOADS
FOR CONCRETE SLABS REINFORCED WITH ¾" STAY-RIB No. 3

Assumed Conditions:

Loads given are Live Loads plus Dead Loads.

Stress in Steel — 16000 lbs. per sq. in.

Stress in concrete (fc) variable as per Table — given in pounds per sq. in.

Ratio of Modulus of Elasticity of Steel (Es) to Modulus of Elasticity of Concrete (Ec) = n = 15.

Distance of Center of Gravity of Lath above Bottom of Sheet — .163 of an inch.

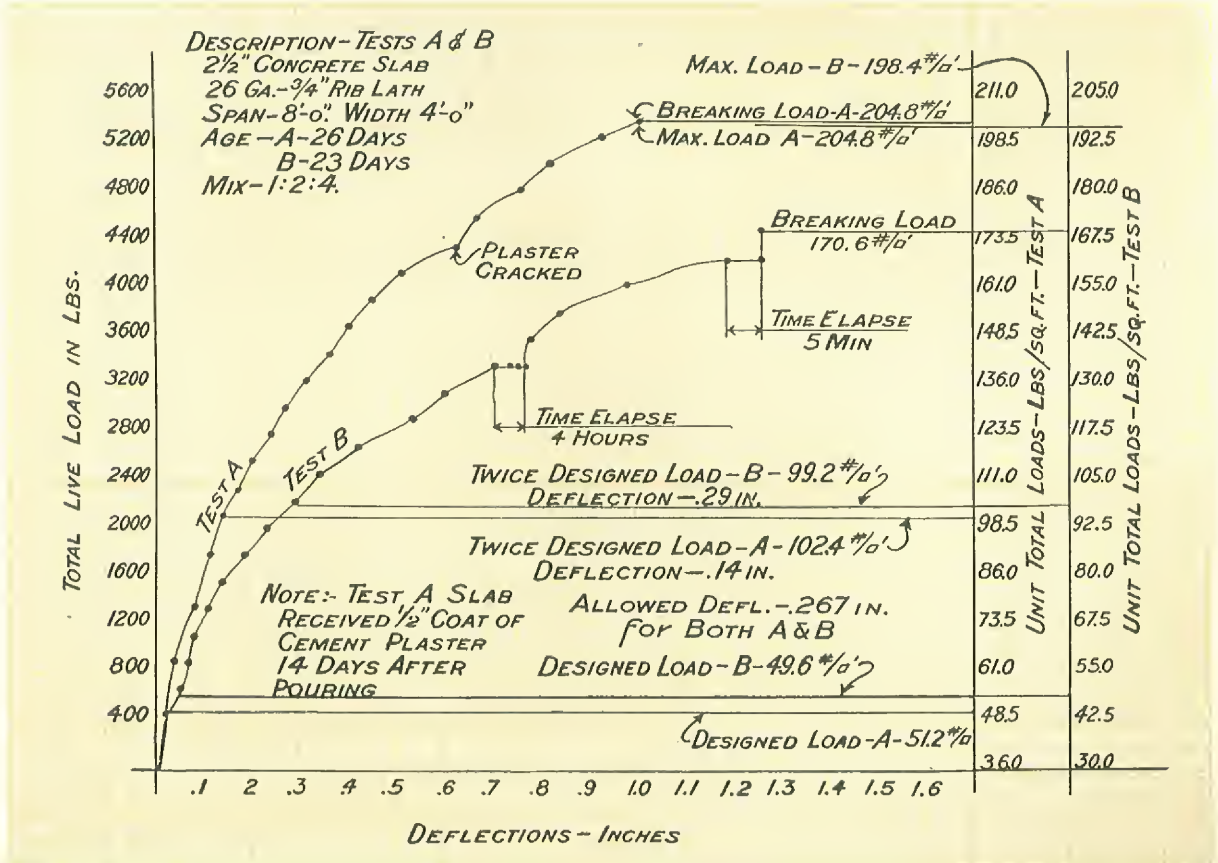
Resisting Moment (R. M.) — Given in Inch Pounds Per Foot Width.

Table Based on moment of $\frac{WL}{10}$

Thickness of Concrete	Weight of Slab, per Sq. ft.	Weight of Slab with ½" Portland Cement Plaster on Under Side	Gauge of Lath	Weight of Lath, per Sq. Foot	Resisting Moment (R. M.) inch lbs. per foot of width	Stress in Concrete in lbs. per sq. in. (fc)	TOTAL SAFE LOADS in Pounds per Square Foot for Spans as Indicated in Feet								
							3′	4′	5′	6′	7′	8′	9′	10′	11′
2″	24 lbs.	30 lbs.	No. 28 Ga.	0.46 lbs.	3230	540	299	168	108	75	55				
2″	24 lbs.	30 lbs.	No. 26 Ga.	.56 lbs.	3840	600	355	200	128	89	65	50			
2″	24 lbs.	30 lbs.	No. 24 Ga.	.74 lbs.	5050	690	468	263	168	117	86	66	52		
2½″	30 lbs.	36 lbs.	No. 28 Ga.	.46 lbs.	4150	460	384	216	138	96	71	54	43		
2½″	30 lbs.	36 lbs.	No. 26 Ga.	.56 lbs.	4940	520	458	258	165	114	84	64	51		
2½″	30 lbs.	36 lbs.	No. 24 Ga.	.74 lbs.	6490	620		338	216	150	110	85	67	54	
3″	36 lbs.	42 lbs.	No. 28 Ga.	.46 lbs.	5084	410	470	265	170	118	87	66	52		
3″	36 lbs.	42 lbs.	No. 26 Ga.	.56 lbs.	6049	460	560	315	202	140	103	79	62	50	
3″	36 lbs.	42 lbs.	No. 24 Ga.	.74 lbs.	7960	550		415	266	184	135	104	82	66	55
3½″	42 lbs.	48 lbs.	No. 28 Ga.	.46 lbs.	6000	380	555	312	200	139	102	78	62		
3½″	42 lbs.	48 lbs.	No. 26 Ga.	.56 lbs.	7160	420		373	238	165	122	93	74	60	
3½″	42 lbs.	48 lbs.	No. 24 Ga.	.74 lbs.	9440	490		490	315	218	161	123	97	78	65
4″	48 lbs.	54 lbs.	No. 28 Ga.	.46 lbs.	6960	350		363	232	161	118	91	72	58	
4″	48 lbs.	54 lbs.	No. 26 Ga.	.56 lbs.	8289	390		432	276	192	141	108	85	69	57
4″	48 lbs.	54 lbs.	No. 24 Ga.	.74 lbs.	10920	460		568	364	252	186	142	112	91	75

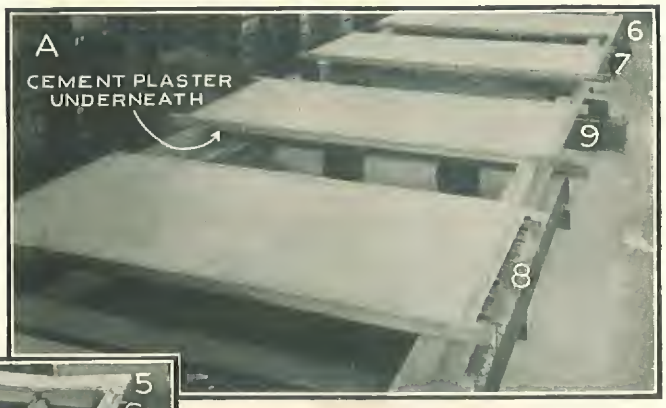
Note:—This table should not be used unless under side of slab is given a coat of Portland Cement Plaster ½-inch thick.

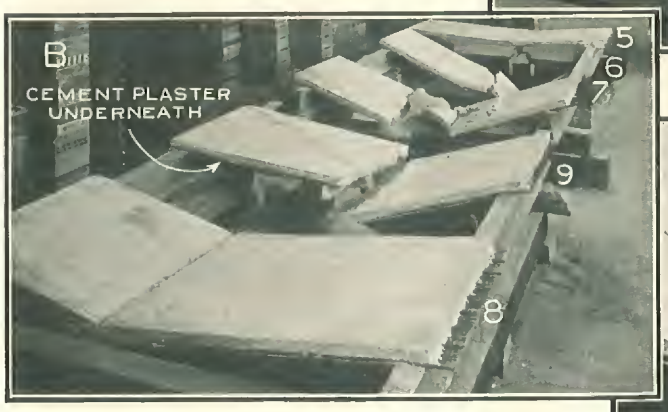
Graphs Showing Result of Tests Which Were Made to Prove the Above Table.
The Tests are Described in the Following Pages.



Description of the Tests that Proved the Safe Load Tables

TO obtain comparative values of various types of high rib metal lath, designed with different shapes of mesh and with different spacings between ribs, these tests were made on four well-known brands of high rib lath, one of which was Milcor ¾-inch Stay-Rib No. 3. The conditions governing the tests on each different brand of lath were kept exactly the same.





For instance, Slab No. 5 was constructed over a well-known brand of 26 Ga. ¾-inch rib lath, the ribs of which are spaced 4.8 inches apart; Slab No. 6 was poured on another brand of 26 Ga. ¾-inch rib lath, the ribs of which are spaced 3⅝ inches apart; Slab No. 7 was poured on still another type of 26 Ga. ¾-inch rib lath, the ribs of which are spaced 4 inches apart; while Slabs No. 8 and No. 9 were poured on Milcor ¾-inch Stay-Rib No. 3, the ribs of which are spaced 6 inches apart.

The five Slabs were poured on March 8, 1927. The tests were made on March 30, 31 and April 2, 1927, thus allowing approximately three

(*Continued on next page.*)

Detailed Explanation of the photos above:

Photo "A" shows four of the five slabs of concrete poured on various types of ¾-inch rib lath, before the loads were placed on them. All temporary supports had been removed. A sand box was constructed around each slab to permit sand to be loaded evenly all over the slab.

Photo "B" shows all of the five slabs after breaking under their respective loads of sand. The sand had been cleared away sufficiently to show the character of the breaks. On all slabs except No. 7 and No. 9, the lath remained intact and pulled away from the concrete to cause failure. The slabs did not pull out or cut the tie wires with which the lath was fastened to the structural steel beams, indicating that the slabs did not pull off their bearings when loaded. Slab No. 6 fell the entire distance to the floor on failure and that caused one end to pull off the support.

Photo "C" shows what happened when an attempt was made to turn over a slab without Portland cement plastering applied on the under side, after it had failed under a breakdown test. The smoothness of the concrete where it had formed over the ribs of the lath emphasizes the fact that little or no bond is obtained at the ribs. The slab did not fail until the bond broke between the concrete and the mesh of the lath. At that point the concrete separated from the ribs. Part of the value of Milcor ¾-inch Stay-Rib No. 3 lies in the fact that there are fewer ribs and a better bond is provided for the concrete over a wider surface of the lath. Portland Cement plaster applied on the under side to a thickness of about ½-inch, seals the bond of the concrete with the lath and greatly increases the strength of the slab. This slab was not plastered on the under side with Portland cement plaster.

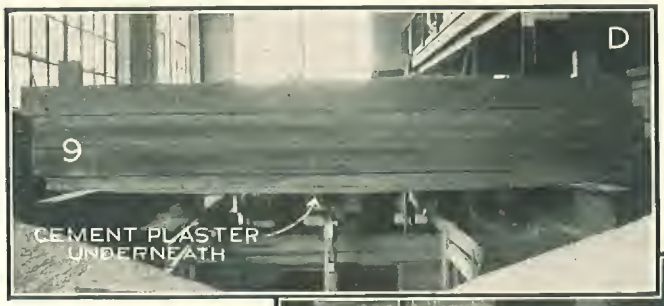
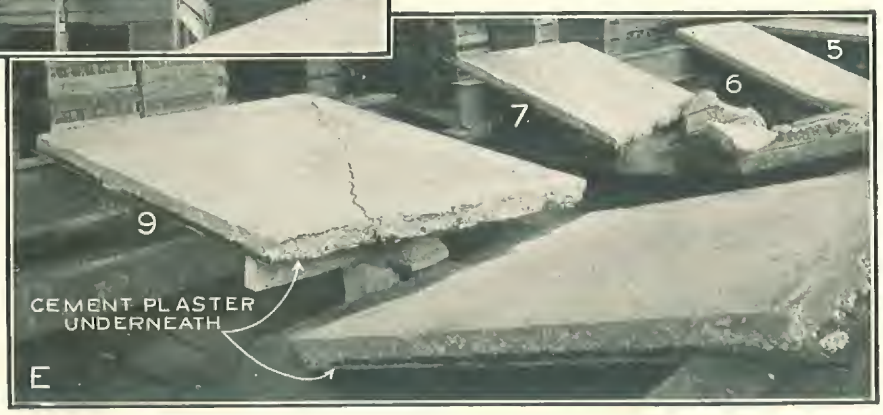


Photo "D" shows a remarkable view of Slab No. 9 just before the rupture occurred. Notice the line of deflection just under the sand box carrying the load. As explained in connection with the Graphs of Results of these tests, on page 9, this slab held a load four times as great as the Designed Load, for one minute and forty seconds before failing.

Photo "E" shows Slab No. 9 immediately after it had failed in this test-to-destruction, with the sand box and sand removed. Notice carefully the perfect bond that remained between the Milcor ¾-inch Stay-Rib No. 3 lath and the concrete after failure, as compared with all the other results. Notice also that the position of the crack was almost exactly at midspan and that the break was clean. Close examination of the picture reveals the layer of Portland cement plaster underneath.



This perfect bond and the clean break at midspan under a load four times as great as the Designed Load is significant of the super-safety of this type of construction with Milcor ¾-inch Stay-Rib No. 3.

weeks for the curing of the concrete. The mix for the concrete on all Slabs was 1:2:4.

All Slabs were poured to a thickness of 2½ inches. The span of each Slab was 8 feet; the width, 4 feet. Slab No. 9 received a coat of Portland Cement Plaster, ½ inch thick, on the under side, two weeks after the Slab had been poured. Temporary supports were used for all Slabs to hold the lath in place while the concrete was being poured. These supports were removed just before the Slabs were tested with loads. Sand was used to insure even loading of the Slabs.

Description of Action and Conclusions

SLAB No. 5 was allowed to stand for four hours with a superimposed load of 3375 lbs., or about 135.5 lbs. per sq. ft., including the weight of the concrete, before adding more weight to the point of destruction. Deflection continued for a short time and then the effect of that load caused no further change. It was then apparent that the Slab would not fail without additional load, which was then added, until failure occurred at a loading of approximately 3½ times the Designed Load. Failure apparently was due to the fact that the lath pulled away from the concrete when the deflection became excessive.

While the capacity of this slab tested considerably greater than twice the Designed Load, it failed to take the theoretical maximum load of four times the Designed Load. In fact, none of the Test Slabs except Slab No. 9 were able to take four times the Designed Load.

The action of Slab No. 6 and the reason for failure were practically the same as described above for Slab No. 5.

Slab No. 7 seemed to form a good mechanical bond between the lath and the concrete and the Slab took more than twice the Designed Load but considerably less than the theoretical maximum load. Deflections on this Slab were considerably greater. The reason for failure was not due to the breaking away of the lath from the concrete, but because of failure of the lath itself.

Slab No. 8 showed action similar to Slabs No. 5 and No. 6. The reason for failure was the separation of the lath from the concrete under a load causing extreme deflection and following that separation from the lath, the concrete slab failed.

Slab No. 9 acted in accordance with the accepted laws governing the design of reinforced concrete. This Slab took a Breaking Load of exactly four times the Designed Load and its deflection when loaded with twice the Designed Load, was about half the allowable. (Refer to Graph of Test A on page 9.) No failure occurred in the bond between lath and concrete. The break took place at midspan, apparently because of simultaneous failure of both the lath and the concrete.

Tests of Reinforced Concrete Floor Construction Over Steel Lumber

THESE tests were conducted to determine the carrying capacity of the concrete slab itself, reinforced with Milcor ¾-inch Stay-Rib No. 3, as well as to determine the strength or full capacity of the complete construction of steel lumber and reinforced concrete slab.

The slabs were designed to accommodate only the strength of the beams. Before loading the slabs, a support at midspan was placed under the beams. Then the slabs were loaded to the full capacity of the beams. Thus the concrete slab, reinforced with this lath, was tested as an individual part of the construction. Then the support was removed and the complete construction was tested further.

With the support removed, the beams were stressed to the limit; but with the support in position under the beams, the reinforced concrete slabs remained unaffected under the maxi-

Continued on next page.

Photo "F" shows a load of 26,000 lbs., or 650 lbs. per sq. ft., on a 2-inch concrete slab (1:2:4 mix), reinforced with 28 Ga. Milcor ¾-inch Stay-Rib No. 3, on 6-inch steel lumber, spaced 30 inches on centers, with a span of 8 feet. This load included the weight of the slab itself as well as the nail kegs and the men. The Designed Load of this Slab was 150 lbs. per sq. ft. Even with the excessive load of 650 lbs. per sq. ft., no cracks developed. This clearly demonstrates the excess of safety assured by this type of construction on floors over steel lumber or bar joists.

Photo "G" offers interesting proof of the perfect condition of the slab after removing the load and raising part of the slab to show the under side. Notice the tight bond between the concrete and the lath, the perfect condition of the slab, and the rigidity of the lath as indicated by the lack of any sag whatsoever from the pouring of the wet concrete on the mesh. You will notice also that there was practically no loss of concrete. The mesh of Milcor ¾-inch Stay-Rib No. 3 does not permit the concrete to drip through. From every standpoint this lath is ideal.

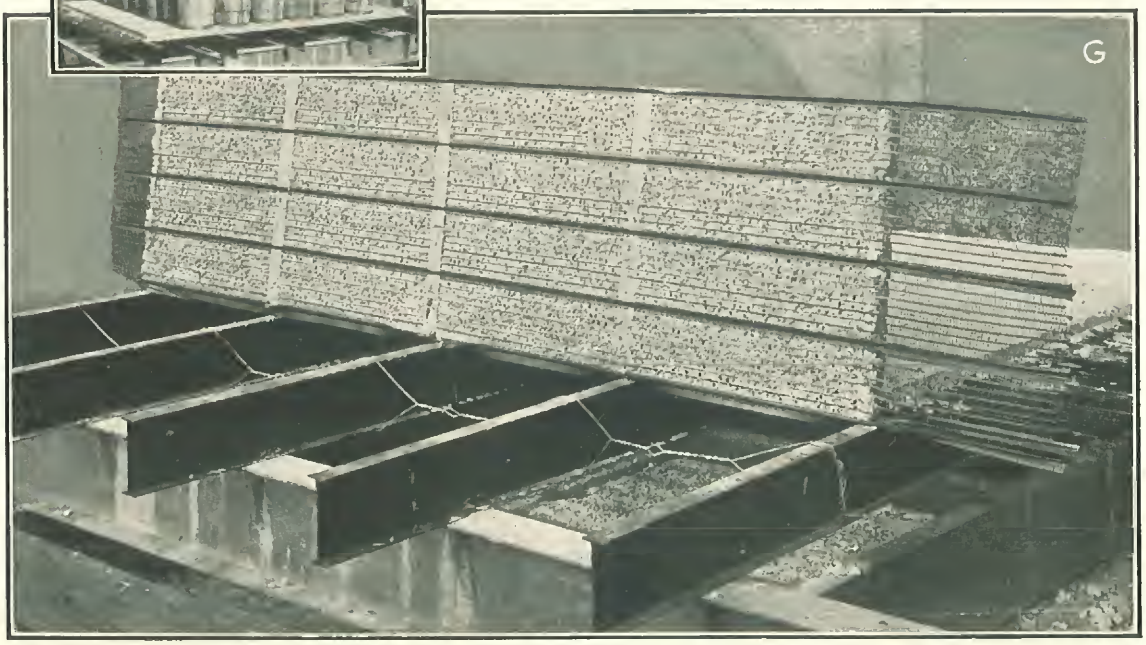


Photo "H" shows a load of 56,948 lbs., or 527 lbs. per sq. ft., on a 3-inch concrete slab (1: 2:4 mix), reinforced with 24 Ga. Milcor ¾-inch Stay-Rib No. 3, on 12-inch steel lumber, spaced 36 inches on centers, with a span of 18 feet. The load of pig iron was concentrated on an area 6 ft. by 18 ft. The total load, including weight of slab, was 563 lbs. per sq. ft. The Designed Load, 123 lbs. per sq. ft.

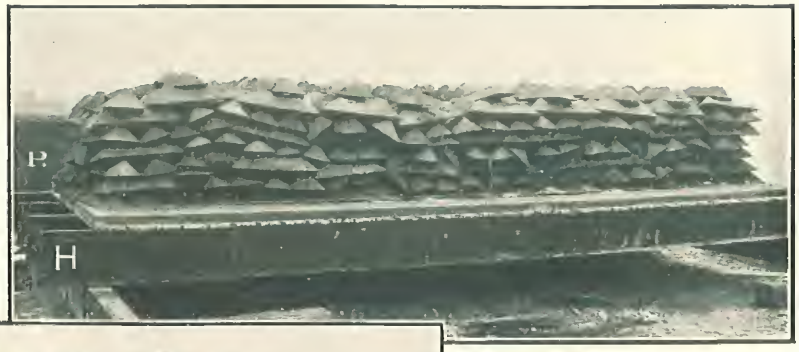
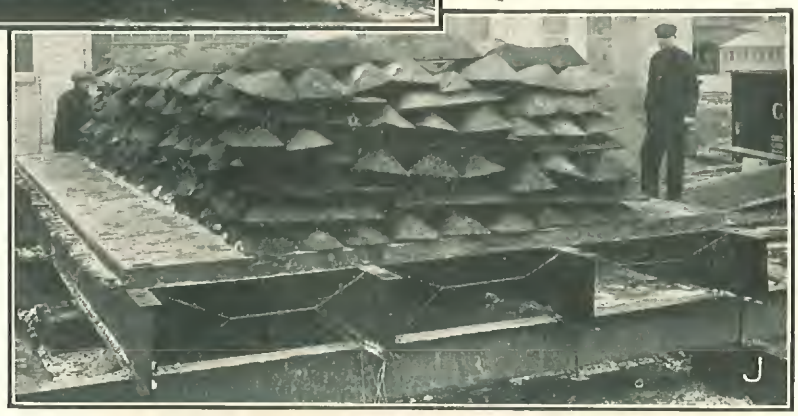


Photo "I" shows the same load in place as in Photo "H," with the additional weight of ten men.

Photo "J" shows the same load as in Photo "H", viewed from the end, so as to show the uniform load directly on the slab. This view shows that the load produced no effect on the slab.

Photos I and J were taken with center support in place under beams. Photo H shows center support removed, which caused a permanent sag of 1⅞ inches in center.



mum load of the steel beams (four times the designed load), which is the governing load for this construction.

In other words, the tests proved that the critical part of the design, as far as carrying capacity of the floor is concerned, is the design of the steel lumber or bar-joist material. **The reinforced concrete floor slab itself will not fail from direct load unless the steel lumber or bar joist construction fails.**

In view of the fact that manufacturers of the various types of steel lumber and bar joists have been very conscientious in keeping their products well up to the standards for which they are designed, liberally safe construction is assured whenever their Design Tables are adhered to.

The tests further proved that Milcor ¾-inch Stay-Rib No. 3 possesses ideal qualities of stiffness, mesh and bond — it carries the wet concrete without sagging; the mesh is close enough to prevent loss or dripping of concrete; and the mesh is open enough to allow a perfect bond between the lath and the concrete. The bond is made still stronger over the entire area of the floor, by reason of the fact that there are fewer ribs in Milcor ¾-inch Stay-Rib No. 3 than in other types of high rib lath.

While this type of rib lath is of more value here as a formwork for the concrete than it is essential as a reinforcing agent, its reinforcing value must not be depreciated. It is the reinforcing quality of this lath that gives life to this type of floor construction, because safety under such tensile stresses and temperature stresses as may develop, is dependent on the presence of this lath embedded in the concrete.

Conclusions from Tests of Floor Construction

FROM the series of tests briefly described on pages 12, 13 and 14, it was very definitely determined that with Milcor ¾-inch Stay-Rib No. 3 used as reinforcement for concrete slabs, the governing factor in the design of the floor system was the design of the steel lumber portion, in all cases. Wherever failure occurred from excessive loading, the failure was in the metal lumber and not in the slabs of concrete and lath. In most cases where evenly distributed loads, calculated to cause complete wrecking, were used, the slabs remained intact. They not only remained intact, but showed no signs of having been stressed unnaturally.

These tests indicated the importance of using a weight of lath stiff enough to carry the wet concrete. As a result of these observations, the Table of Allowable Spans for various gauges of Milcor ¾-inch Stay-Rib No. 3 carrying wet concrete were established, as given on page 8.

Results obtained also showed that each 24-inch width of lath must be securely tied to the supports at least three times. This means tying or clipping once over the center rib of the sheet and once over each outside rib where it overlaps the adjoining sheet.

It was also concluded from these tests, that the thickness of the concrete slab reinforced with this lath should never be less than 2 inches.

General Conclusions from All Tests

PARTICULAR emphasis should be placed on the fact that if reinforced concrete slab construction be made to agree in capacity with the principles governing reinforced concrete, the mechanical bond between the lath and the concrete *must* be sealed by a protective covering of *Portland cement plaster*. This must not be looked upon merely as a *recommendation* — it is *vital* to correct construction.

These and other tests not described here, also emphasize the fact that regardless of the cross-sectional area of the lath, or of the spacing of the ribs, or of the gauge of the lath, or of the thickness of the concrete, or of the conditions under which the slab is built, the *real governing factor* is the *bond* between the lath and the concrete.

These tests further show that the requirement for back-plastering on the under side of the slab applies particularly in cases of roof construction, because of the long spans of the slabs. Floors over steel lumber or bar joists have spans so short in proportion to the loads that can be carried by this structural system, that there is practically no possibility of affecting the bond in the Slab, regardless of excess loading. It is not essential, therefore, to back-plaster the underside of the slab on short-span steel lumber or bar joist construction, but everywhere else this back-plastering with Portland cement plaster is vital if you expect to adhere to engineering principles for reinforced concrete.

On long span roof construction it is much more economical to plaster the under side of the slab with Portland cement plaster than to increase the size of the slab or shorten the spans to the extent required for safety.

In none of these tests did the spacing of ribs have any bearing on the capacity of the lath to carry wet concrete. Regardless of ribs, each type of lath that was tested acted in accordance with the limitations prescribed by the Table on page 8, which indicates the spans over which each gauge of lath will carry various thicknesses of wet concrete.

Firesafety

Numerous tests and actual experience have thoroughly established the firesafety of this type of metal lath construction, with plaster or concrete, for partitions or floors, elevator shafts, stairways, etc. — in fact, wherever the highest degree of fireproof construction is demanded. Not only does this type of construction with Milcor ¾-inch Stay-Rib No. 3 offer real firesafety, which of course is the most important consideration, but it is also economical — in fact, more economical than any other type of truly firesafe, permanent construction.

Summary of Conclusions

HERE is a summary of the conclusions drawn from results of tests which were made to determine *strength* and *action* of Milcor ¾-inch Stay-Rib No. 3 Lath, as a Form for wet concrete and a Reinforcing Agent for Concrete Slabs:

1. When used with concrete for slabs over metal lumber, tests proved that the strength of the reinforced concrete slabs was far in excess of that of the metal lumber. Therefore, for usual conditions and standard spacings of metal lumber, the design of the metal lumber construction governs the strength of the entire floor construction where concrete slab floors are reinforced with Milcor ¾-inch Stay-Rib No. 3.

2. Varied spacing of the ribs in different types of ¾-inch rib lath is unimportant as long as lath will carry wet concrete over spaces, as indicated in Table on page 8. Tests show absolutely no difference in capacity of Lath as a Form for wet concrete whether ribs are 6 inches apart or whether ribs are spaced closer than 6 inches.

3. No bond is provided between the rib of the lath and the concrete. Therefore the fewer ribs in a sheet, the greater the bonding area. Only enough ribs are required to render the lath stiff enough to act as a Form without sagging.

4. For long span concrete slabs reinforced with ¾-inch Rib Lath, the Table of Safe Loads given on page 9, should be used only if ½ inch of Portland Cement Plaster is applied to underneath side.

5. If slabs are not back plastered with Portland Cement Plaster, failure is likely to occur in bond between Lath and concrete, which will cause the entire slab to fail.

6. Concrete slabs must be cured with care so that the concrete will not dry out too quickly and cause improper mechanical bond between Lath and concrete.

7. Each width of lath must be fastened to steel lumber or bar joists in at least three places — at center and both edges.

Engineering Service

We are in position to render expert engineering advice on all types of buildings. Consultations frequently develop methods of effecting important economies as well as assuring firesafe, investment-safe, permanent construction.

Appointments arranged at your convenience.

Other MILCOR Products

Netmesh Diamond Expanded Metal Lath — **Stay-Rib Metal Lath No. 1** — **⅜-inch Stay-Rib No. 2**

Expansion Corner Beads — **Expansion Casings** — **Expansion Base Screed**

Expansion Bull Nose Corner Bead — **Concealed Metal Picture Molding**

Superior and Milcor Corner Beads — **Curved Point and Plain Base Screed**

Ventilators — **Window Stools, etc.** — **Metal Bases** — **Skylights**

Eaves Trough — **Metal Ceilings** — **Metal Roofing**

Conductor Pipe and Trimmings — **Stove Pipe and Elbows** — **Furnace Pipe and Fittings**

Architectural Sheet Metal — **Marquees**

And Other Sheet Metal Products

HOTEL SCHROEDER — Milwaukee

Schroeder Hotel Company, Owners.

Holabird & Roche, Architects
W. W. Oeflein, Inc., Contractors.

Ernst Jahn & Sons Lathing & Plastering Corp., Plastering Contractors.

Finest hotel in the Northwest — twenty-five stories — total height 275 feet — cost approximately $3,500,000. Milcor Metal Lath, Furring, Steel Channels, Expansion Corner Bead No. 1, BULL NOSE Expansion Corner Bead No. 10, and other Milcor Sheet Metal Products used throughout.

MILWAUKEE CORRUGATING COMPANY

Manufacturers of

METAL LATH AND SHEET METAL BUILDING PRODUCTS

MILWAUKEE, WISCONSIN

CHICAGO, ILL. KANSAS CITY, MO. LA CROSSE, WIS. BOSTON, MASS.


MILCOR
FIRESAFE
BUILDING PRODUCTS
MILWAUKEE CORRUGATING
COMPANY
MILWAUKEE, WISCONSIN